CATALOG DOCUMENTATION
REGIONAL ENVIRONMENTAL MONITORING AND ASSESSMENT PROGRAM - REGION 6
1993-1994 TEXAS COAST RIVERS AND ESTUARIES STUDY
FISH/INVERTEBRATE TISSUE CHEMISTRY

TABLE OF CONTENTS

1. DATA SET IDENTIFICATION

1.1 Title of Catalog Document

Regional Environmental Monitoring And Assessment Program - Region 6
1993-1994 Texas Coast Rivers And Estuaries Study
Fish/invertebrate Tissue Chemistry

1.2 Authors of the Catalog entry

Melissa M. Hughes, OAO Corp.

1.3 Catalog Revision Date

March 31, 1998

1.4 Data File Name

TISUCHEM

1.5 Task Group

Region 6

1.6 Data set identification code

00010

1.7 Version

001

1.8 Requested Acknowledgment

If you plan to publish these data in any way, EPA requires a standard statement for work it has supported:

"Although the data described in this article have been funded wholly or in part by the U. S. Environmental Protection Agency through its R-EMAP Program, it has not been subjected to Agency review, and therefore does not necessarily reflect the views of the Agency and no official endorsement should be inferred."

2. INVESTIGATOR INFORMATION

2.1 Principal Investigator

Charlie Howell
U. S. Environmental Protection Agency - Region 6
Environmental Services Division

2.2 Investigation Participant-Sample Collection

Not applicable

3. DATA FILE ABSTRACT

3.1 Abstract of the Data File

The tissue chemistry data set presents the concentrations of a suite of organic and inorganic analytes extracted from the tissue of a target species (a pre-determined list of fish and/or invertebrate species of ecological and/or environmental importance) collected at a station. There is one (1) record for each analyte measured in a sample. A code for each compound is given under ANALYTE. These include inorganics, PCBs, and pesticides. Individual and summed analyte concentrations are presented. The concentration for each analyte is reported in mass units on wet weight basis. Units are reported under a separate attribute, CHMUNITS, as ug/g, ng/g, % or umoles/g. Quality Assurance/Quality Control issues are coded. Depending on the QA code, only a detection limit may be reported. Each

taxon is identified by a unique code that can be cross-referenced to the taxon phylogeny. A "type" code indicates a general category of organism (ie., fish or shrimp) from which the tissue was sampled.

3.2 Keywords for the Data file

Contaminants, DDT, metals, inorganic analytes, organic analytes, PCB, pesticides, QA Code, fish tissue, tissue chemistry

4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective

The R-EMAP Texas Coast project will:

1. Determine the extent and magnitude of tri-butyltin (TBT) contamination in Galveston Bay sediment and water column.
2. Determine the extent and magnitude of contaminant levels in the fish and sediment of the East Bay Bayou of Galveston Bay and whether the incidence of fish pathologies is correlated with sediment contamination.
3. Determine the levels of chlorinated hydrocarbons in fish tissue, conduct chemical and toxicity tests of sediments and determine benthic community structure in the tidal reaches of the Arroyo Colorado and the Rio Grande Rivers.
4. Determine the extent and magnitude of anoxia and concentrations of agriculture-related contaminants found in the tidal reaches of the Arroyo Colorado and Rio Grande Rivers.

4.2 Data Set Objective

The specific objective of this investigation was to collect information on the levels of chemical contaminants in fish and invertebrates collected in the estuaries and rivers of the south Texas coast.

4.3 Data Set Background Information

Human health concerns about the levels of contaminants in fish and invertebrates have increased over the past decade. To address these concerns on a regional scale, the R-EMAP Texas project collected fish and invertebrates in 1993-1994 for chemical analyses because of the findings of high levels of some contaminants (TBT) in fish tissue collected from the R-EMAP study area. Edible tissue from selected species were analyzed for PCBs, TBT, selected pesticides, and metals to determine if a significant health risk existed.

4.4 Summary of Data Set Parameters

Muscle tissue from fish and invertebrates caught in trawls performed at sampling stations was analyzed for PCBs, selected pesticides, and metals. The organic and inorganic compound concentrations measured generally included: 13 major and trace elements, the pesticide, DDT, and its metabolites, 12 pesticides

other than DDT, 21 individual Poly-Chlorinated Biphenyl (PCB) congeners, more than 30 Poly-Aromatic Hydrocarbons (PAHs) and the butyltins (MBT, DBT, TBT). This suite of analytes is similar to that measured in the National Oceanic and Atmospheric Administration's (NOAA) National Status and Trends (NS&T) program. Values in this data file include individual inorganic and organic compound concentrations and concentrations summed for several major groups: total PCBs, total DDTs, total chlorinated pesticides. Concentrations of all tissue chemistry analytes are reported on a wet weight basis.

4.5 Year-Specific Information about Data

Up to three fish trawls per station were conducted and indicators between the first of two successfully completed trawls were averaged. This increased the chances that nekton specific data would be more accurately represented and tissue chemistry samples would be available for each site. Occasionally, however, a field crew would conduct more then three (3) trawls in order to obtain enough tissue samples for chemistry analysis. Any trawl conducted after the first three (3) attempts was not used for any of the summary calculations. The actual number of trawls taken for each stations is reflected in the Fish Abundance data file.

Tissue samples were obtained from target species only. The list of target species included: 4 species of catfish, penaeid shrimp and Atlantic croaker

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

To collect fish and invertebrate samples suitable for chemical residue analyses of edible tissue. Organisms were collected from one or more trawls performed at EMAP sampling stations.

The following table contains the EMAP species codes, genus, species and common names for associated fish/invertebrates selected for chemical analysis. The composition of the target species was based on:(1) the expectation of capture at a high percentage of stations, (2) commercial/recreational value, and (3) use by one or more coastal states in tissue toxics monitoring programs. Catch expectations were estimated by conducting a retrospective analysis of available finfish and shellfish monitoring data collected by resource agencies in each of the Gulf states.

Species Code	Genus	Species	Common Name
MICRUNDU	Micropogonias	undulatus	Atlantic Croaker
ARIUFELI	Arius	felis	Hardhead Catfish
BAGRMARI	Bagre	marinus	Gafftopsail Catfish

Species Code	Genus	Species	Common Name, cont.
ICTAFURC	Ictalurus	furcatus	Blue Catfish
ICTAPUNC	Ictalurus	punctatus	Channel Catfish
CALLSAPI	Callinectes	sapidus	Blue Crab
PENAAZTE	Penaeus	aztecus	Brown Shrimp
PENADUOR	Penaeus	duorarum	Pink Shrimp
PENASETI	Penaeus	setiferus	White Shrimp

5.1.2 Sample Collection Methods Summary

A balloon trawl (funnel-shaped net) was deployed from the sampling vessel using a hydraulic powered boom and winch system and dragged over the bottom in the general vicinity of the sampling station to capture bottom and near-bottom fishes and crustaceans. The duration of a trawl was 10 +- 2 minutes and the rate of speed over bottom was 2-3 knots. Following a successful trawl, the net was hauled aboard and the catch was released into a plastic trough or fish sorting table.

Crews were instructed to select the first five individuals collected of specific target species (see Appendix B Table 1) for chemical analysis. Individuals should have been within a 20-40 cm range. If fewer than five individuals were collected in the standard trawl, a third trawls was performed to collect more organisms solely for acquiring enough sample tissue for chemistry analysis. The crew chief determined the duration of a third trawl if conducted at a site. The community structure (See Fish Species and Community) does not include any organisms collected during a third trawl. Occasionally, even a third trawl did not result in enough tissue sample for a full complement of analyses.

After fish/shrimp for chemical analyses were measured, whole organisms were placed in zip-lock bags with one species per bag. The number of specimens per species placed in each bag was contingent on the size of the fish. Samples were then placed immediately on wet ice for transport back to the mobile field laboratory where they were frozen on dry ice prior to shipment to the destination lab.

5.1.3 Beginning Sampling Dates

24 September 1993
10 August 1994

5.1.4 Ending Sampling Date

10 October 1993
16 August 1994

5.1.5 Platform

Each team was supplied with a 25-foot SeaArk work boat

equipped with a 7.5 L gas engine fitted with a Bravo outdrive, an "A" frame boom assembly and hydraulic winch. On-board electronics consist of: a Loran C unit, GPS, radar unit, 2 VHF radios, cellular phone, compass, a depth finder, a tool kit, and all required and suggested safety equipment.

5.1.6 Sampling Equipment

The net used was a 4.9 m (16 ft) -wide, balloon (high profile) trawl with 2.5 cm (1 in) stretched mesh in the bosom, wings, and cod end; no liner was used. The trawl was equipped with 41 X 76 cm (16 X 30 in) wooded doors.

5.1.7 Manufacturer of Sampling Equipment

NA

5.1.8 Key Variables

Values were not measured at time of collection.

5.1.9 Sampling Method Calibration

The sampling equipment required no calibration. It only needed to be inspected to insure that the net had not been damaged during previous trawls.

5.1.10 Sample Collection Quality Control

If the trawl was successful and fish were caught, the specimens designated for chemistry or pathology analysis were contained appropriately for shipping to various labs. Each species of fish for a particular station were tracked using a barcode system. As the field crew prepared the specimens for shipping, the fish would be grouped by species and type of lab analyses needed then tagged with a waterproof barcode label bearing a unique identification number. A duplicate barcode was place on the appropriate data sheet. Each barcode label was scanned into a data file using laser barcode readers. This method of tagging provided the R-EMAP team an efficient, accurate and viable accounting of fish shipped to laboratories for further analysis. The laboratories were also supplied with barcode readers so fish received by lab personnel could be documented. The lab receiving files were electronically forwarded to R-EMAP for shipping and receiving reconciliation.

Additionally, periodic field visits were conducted by the QA Officer, Province Manager or other designee(s) throughout the sampling season to ensure proper identification, enumeration, measurement and packaging techniques were being used.

5.1.11 Sample Collection Method References

Macauley, J.M. 1991. Environmental Monitoring and Assessment Program-Near Coastal Louisianian Province: 1991 Monitoring Demonstration. Field Operations Manual. EPA/600/X-91/XXX. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

5.1.12 Sample Collection Method Deviations

None

5.2 Data Preparation and Sample Processing

5.2.1 Sample Processing Objective

To measure the levels of selected contaminants in fish and invertebrate composite samples collected at EMAP stations.

5.2.2 Sample Processing Methods

In the laboratory, the sample of composited fish/shrimp was removed from the freezer and allowed to thaw. The sample was rinsed with distilled water and, when available, five individuals were selected for tissue analysis. A composite of five individuals was considered the ideal sample size; however, at times, less than five individuals were available and at other times, when the fish/shrimp were small, the composited sample size was increased to more than five individuals in order to provide an adequate volume of tissue for the analyses.

The scales were removed from those species with scales. Fish were filleted using either a ceramic or titanium bladed knife. A fillet included the skin (except for catfish) and edible muscle tissue from just posterior of the gills to the tail area and laterally, from the mid-dorsal line and continuing down to the belly flap. Any bones were carefully removed from the filleted tissue. for shrimp samples, only the tail muscle was taken for analysis and the shells were also removed. The sample preparations were meant to emulate the manner in which most people are believed to prepare the respective species for human consumption.

The sample of fillets from the composited fish was cut into a very small dice/mince using the ceramic or titanium blade and then homogenized as uniformly as possible before being split into separate aliquots for organic and inorganic analyses. The use of a tissue homogenizer was avoided at this point to prevent possible contamination to the inorganic fraction from the stainless steel blades (a titanium bladed homogenizer was not available to the laboratory).

The aliquot for inorganic analysis was microwave digested

in HNO3/HCl and analyzed by flame atomic absorption (AA) or graphite furnace AA spectrophotometry (cold vapor AA was used for Hg analysis).

The aliquot for organic analysis was extracted by sonification in acetonitrile followed with back extraction from water with petroleum ether. The pet ether extract was dried over sodium sulfate, evaporated to volume and cleaned up through a Florisil column with ether/hexane as elutants. Final volume was taken to 1 ml and the sample was transferred to an autosampler vial and capped. Analyses of PCBs and chlorinated pesticides was by GC-ECD.

All concentrations are reported on a wet weight basis.

5.2.3 Sample Processing Method Calibration

N/A

5.2.4 Sample Processing Quality Control

N/A

5.2.5 Sample Processing Method Reference

U.S. EPA. 1995. Environmental Monitoring and Assessment Program (EMAP): Laboratory Methods Manual - Estuaries, Volume 1: Biological and Physical Analyses. United States Environmental Protection Agency, Office of Research and Development, Narragansett, RI. EPA/620/R-95/008.

6. DATA ANALYSIS AND MANIPULATIONS

6.1 Name of New or Modified Value

TOT_ANAL

6.2 Data Manipulation Description

6.2.1 TOT_ANAL

Some of the codes in ANALYTE represent summed concentrations from other analytes. Examples of this include Total PAHs, Total DDTs, etc. In this case, the ANALYTE was not directly reported by the laboratory but is the result of summing the concentrations of analytes in a group. TOT_ANAL represents the number of concentrations that were summed for a given analyte.

7. DATA DESCRIPTION

7.1 Description of Parameters

Field Name	Data Type	Field Len	Format	Variable Field Label
STA_NAME	Char	8	8.	The Station Identifier
VST_DATE	Num	8	YYMMDD6.	The Date the Sample was Collected

Field Name	Data Type	Field Len	Format	Variable Field Label, continued
SAMPTYPE	Char	10	$10.	Sample Type
SPECCODE	Char	9	$8.	EMAP Species Code
COMPOSIT	Char	3	$3.	Composite Sample
ANALYTE	Char	8	8.	Analyte Code
CONC	Num	13	13.6	Conc. of Analyte (dry wt.) Units
CHMUNITS	Char	12	12.	Concentration
TOT_ANAL	Num	8	12.	Analytes (#) in Summed Conc.
QA_CODE	Char	15	15.	Quality Assurance Code for Data
TOT_REP	Num	8	3.	Number of Replicates
SAMP_ID	Char	50		EMAP Sample id
LABSAMP	Char	50		GERG Sample id
WETWTCV	Num	8	7.4	Wet wt conversion factor
TISUTYPE	Char	20		Tissue Type
DETLIMIT	Num	13	13.6	Method Detection Limit for Analyte

NOTE: This data set needs to be sorted by the following variables in the following order:

STA_NAME SAMP_ID LABSAMP TISUTYPE SPECCODE ANALYTE

7.1.6 Precision to which values are reported

The tissue chemistry concentrations presented are in a format of 6 decimal places. This format is necessary because some concentrations are in ug/g and some concentrations are in ng/g. However, the concentrations are only valid FOR THREE SIGNIFICANT FIGURES (not necessarily three decimal places), e.g., 345.67 ug/g is 346 ug/g but 0.00235 ng/g remains as 0.00235 ng/g.

7.1.7 Minimum/Maximum Value in Data Set for CONCENTRATION

	CONC	
ANALYTE	MINIMUM	MAXIMUM
ACENTHE	0.700	35.000
ACENTHY	0.300	10.100
AG	0.003	1.400
AL	1.200	991.000
ALDRIN	.	.
ALPHACHL	1.200	6.280
ANTHRA	0.300	9.800
AS	0.420	54.000
BENANTH	0.100	6.300
BENAPY	0.100	3.200
BENEPY	0.100	7.300
BENZOBFL	0.100	15.000
BENZOKFL	0.100	2.000
BENZOP	0.100	3.400
C1CHRYS	1.000	564.300
C1DIBENZ	1.400	31.000
C1FLRAN	2.200	111.100
C1FLUOR	3.700	87.900

7.1.7 Minimum/Maximum Value in Data Set for CONCENTRATION, cont.

	CONC	
ANALYTE	MINIMUM	MAXIMUM
C1NAPH	9.300	298.300
C1PHENAN	2.400	170.200
C2CHRYS	0.800	75.100
C2DIBENZ	4.600	71.800
C2FLUOR	7.400	119.600
C2NAPH	11.800	435.600
C2PHENAN	6.400	204.800
C3CHRYS	.	.
C3DIBENZ	4.900	116.100
C3FLUOR	20.700	180.800
C3NAPH	18.600	499.300
C3PHENAN	8.400	199.500
C4CHRYS	.	.
C4NAPH	10.900	327.800
C4PHENAN	4.300	99.800
CARBOFEN	83.000	83.000
CD	0.012	0.537
CR	0.610	22.000
CU	0.170	60.380
DBT	60.000	754.000
DDT_TOT	6.040	36.380
DIAZINON	.	.
DIBENZ	0.200	10.800
DIBENZO	0.200	10.800
DICOFOL	.	.
DIELDRIN	0.190	15.220
DIMETH	1.600	132.800
DISULFOT	.	.
DURSBAN	.	.
ENDOSUL1	.	.
ENDOSUL2	.	.
ENDRIN	.	.
ETHION	50.000	50.00
FE	1.200	690.00
FLUORENE	.	.
HEPTACHL	0.650	1.98
HEPTAEPO	.	.
HEXACHL	.	.
HG	0.023	0.89
INDENO	0.100	7.80
LINDANE	0.200	1.64
MBT	35.000	730.00
MENAP1	2.900	112.30
MENAP2	5.300	186.00
MEPHEN1	0.200	31.30
MIREX	0.060	1.22
MTLS_TOT	63.977	1754.07
NAPH	12.600	99.20
NI	0.020	5.73
OPDDD	0.360	6.19
OPDDE	.	.

7.1.7 Minimum/Maximum Value in Data Set for CONCENTRATION, cont.

	CONC	
ANALYTE	MINIMUM	MAXIMUM
OPDDT	.	.
OXYFL	.	.
PAH_TOT	63.000	2657.10
PB	0.010	0.64
PCB101	2.670	36.38
PCB105	0.500	5.10
PCB118	1.160	29.28
PCB126	0.840	2.34
PCB128	0.250	4.19
PCB138	3.360	59.06
PCB153	5.090	112.14
PCB170	0.960	28.67
PCB18	0.140	0.49
PCB180	1.720	55.20
PCB187	2.670	53.04
PCB195	0.290	5.77
PCB200	0.140	3.70
PCB206	0.200	6.42
PCB209	0.260	5.17
PCB28	0.310	5.76
PCB29	0.220	0.59
PCB44	0.460	4.22
PCB52	0.850	14.6 PCB105 0.500
PCB57	280.80	.5
PCB5	00.221	122
PCB57	20.590	14122
PCB4TOT	627140	394.5
PCESOT _	1.260	26 1CESO.880.80 2.16 D6

7.1.8 Minimum/Maximum Value in Data Set for DETECTION LIMIT

Detlimit

ANALYTE	MINIMUM	MAXIMUM
ACENTHE	.	.
ACENTHY	.	.
AG	0.010	0.013
AL	7.200	10.000
ALDRIN	0.500	0.500
ALPHACHL	2.200	2.200
ANTHRA	.	.
AS	1.000	2.000
BENANTH	.	.
BENAPY	.	.
BENEPY	.	.
BENZOBFL	.	.
BENZOKFL	.	.
BENZOP	.	.
C1CHRYS	.	.
C1DIBENZ	.	.
C1FLRAN	.	.
C1FLUOR	.	.
C1NAPH	.	.
C1PHENAN	.	.
C2CHRYS	.	.
C2DIBENZ	.	.
C2FLUOR	.	.
C2NAPH	.	.
C2PHENAN	.	.
C3CHRYS	.	.
C3DIBENZ	.	.
C3FLUOR	.	.
C3NAPH	.	.
C3PHENAN	.	.
C4CHRYS	.	.
C4NAPH	.	.
C4PHENAN	.	.
CARBOFEN	0.500	0.500
CD	0.007	0.200
CR	0.100	0.100
CU	0.990	2.000
DBT	35.000	35.000
DDT_TOT	.	.
DIAZINON	0.500	0.500
DIBENZ	.	.
DIBENZO	.	.
DICOFOL	100.600	100.600
DIELDRIN	0.900	0.900
DIMETH	.	.
DISULFOT	0.500	0.500
DURSBAN	0.500	0.500
ENDOSUL1	1.300	1.300
ENDOSUL2	8.150	8.150
ENDRIN	1.300	1.30
ETHION	0.500	0.50

7.1.8 Minimum/Maximum Value in Data Set for DETECTION LIMIT, cont.

Detlimit

ANALYTE	MINIMUM	MAXIMUM
FE	15.000	37.20
FLUORENE	.	.
HEPTACHL	0.900	0.90
HEPTAEPO	1.900	1.90
HEXACHL	1.600	1.60
HG	0.004	0.01
INDENO	.	.
LINDANE	0.400	0.40
MBT	35.000	35.00
MENAP1	.	.
MENAP2	.	.
MEPHEN1	.	.
MIREX	0.600	0.60
MTLS_TOT	.	.
NAPH	.	.
NI	0.100	0.50
OPDDD	1.800	1.80
OPDDE	1.300	1.30
OPDDT	1.900	1.90
OXYFL	24.500	24.50
PAH_TOT	.	.
PB	0.070	0.10
PCB101	1.500	1.50
PCB105	1.500	1.50
PCB118	1.500	1.50
PCB126	1.500	1.50
PCB128	1.500	1.50
PCB138	1.500	1.50
PCB153	1.500	1.50
PCB170	1.500	1.50
PCB18	1.500	1.50
PCB180	1.500	1.50
PCB187	1.500	1.50
PCB195	1.500	1.50
PCB200	1.500	1.50
PCB206	1.500	1.50
PCB209	1.500	1.50
PCB28	1.500	1.50
PCB29	1.500	1.50
PCB44	1.500	1.50
PCB52	1.500	1.50
PCB66	1.500	1.50
PCB77	1.500	1.50
PCB8	1.500	1.50
PCB87	1.500	1.50
PCBTOT_L	.	.
PCB_TOT	.	.
PESTOT_L	.	.
PEST_TOT	.	.
PPDDD	0.900	0.90
PPDDE	1.800	1.80

7.1.8 Minimum/Maximum Value in Data Set for DETECTION LIMIT, cont.

Detlimit

ANALYTE	MINIMUM	MAXIMUM
PPDDT	0.400	0.40
PYRENE	.	.
SE	0.530	1.00
SN	0.015	0.05
TBT	35.000	35.00
TERBUFOS	0.500	0.50
TNONCHL	0.500	0.50
TOXAPHEN	.	.
TRIMETH	.	.
ZN	3.800	10.00

7.2 Data Record Example

7.2.1 Column Names for Example Records

```
STA_NAME;SAMPTYPE;SPECCODE;COMPOSIT;CHMUNITS;ANALYTE;CONC;DETLIMIT;QACODE;
TOT_REP;TOT_ANAL;SAMP_ID;LABSAMP;WETWTCV;TISUTYPE;QA_CODE;
```

7.2.2 Example Data Records

```
STA_NAME;SAMPTYPE;SPECCODE;COMPOSIT;CHMUNITS;ANALYTE;CONC;DETLIMIT;QACODE;
TOT_REP;TOT_ANAL;SAMP_ID;LABSAMP;WETWTCV;TISUTYPE;QA_CODE;
LA93AC1;FISH;ARIUFELI;Y;ng/g dry wt;ACENTHE;0.800000;.; ;1;.;FC0003;6293;
0.2216;Muscle; ;
LA93AC1;FISH;ARIUFELI;Y;ng/g dry wt;ACENTHY;0.800000;.; ;1;.;FC0003;6293;
0.2216;Muscle; ;
LA93AC1;FISH;ARIUFELI;Y;ug/g dry wt;AG;.;0.010000;SC-A;1;.;FC0003;6293;0.2080;
Muscle; ;
LA93AC1;FISH;ARIUFELI;Y;ug/g dry wt;AL;15.100000;.; ;1;.;FC0003;6293;0.2080;
Muscle; ;
LA93AC1;FISH;ARIUFELI;Y;ng/g dry wt;ANTHRA;2.900000;.; ;1;.;FC0003;6293;
0.2216;Muscle; ;
```

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-97 Degrees 36 Minutes 16.20 Decimal Seconds

8.2 Maximum Longitude

-94 Degrees 24 Minutes 33.00 Decimal Seconds

8.3 Minimum Latitude

25 Degrees 57 Minutes 28.80 Decimal Seconds

8.4 Maximum Latitude

29 Degrees 43 Minutes 49.80 Decimal Seconds

8.5 Name of area or region

Coastal distribution of sampling is in Galveston Bay, the East Bay Bayou of Galveston Bay and the Arroyo Colorado and the Rio Grande River systems in Texas.

9. QUALITY CONTROL AND QUALITY ASSURANCE

Because of the complexity and importance of tissue contaminant data, EMAP has expended a tremendous effort in the Quality Assurance of these data as is reflected in the detail provided in this section.

9.1 Measurement Quality Objectives

Measurement Quality Objectives (MQOs) for the R-EMAP Texas analyses of chemical contaminants in tissue were defined in the Louisianian Province Quality Assurance Project Plans (Heitmuller and Valente, 1992). The QAPP required each laboratory to analyze the following quality control (QC) samples along with every batch or "set" of field samples collected for analytical chemistry: laboratory reagent blank, calibration check standards, laboratory fortified sample matrix (matrix spike), laboratory duplicate (or matrix spike duplicate), and Laboratory Control Material (LCM). Results of these QC samples had to fall within certain preestablished control limits.
Because of EMAP-Estuaries' performance-based approach to QA/QC for analytical chemistry, Standard or Certified Reference Materials (SRMs or CRMs) were typically used as the LCM. SRMs and CRMs have known or "certified" concentrations for many of the analytes being measured and are representative of the matrices of interest. Therefore, SRMs/CRMs are useful for assessing both the accuracy and precision capabilities of the analytical laboratory. The QAPP required the laboratory's average percent recovery (relative to the certified or accepted concentration in the reference material) to fall within the range of 80 to 120% for each inorganic analyte and 65 to 135% for each organic analyte. The QC goal for precision was that the coefficient of variance (CV) of the percent recoveries for a given LCM analyte, across all batches, remain <-30%. If the laboratory consistently failed to meet these accuracy or precision goals for the LCM, the values reported for the failed analytes were considered to be suspect and were flagged.

The laboratory established method detection limits (MDLs) for each analyte of interest; the reported MDL level was based on a calculated value that represented the laboratory's low end capability (minimal quantity for measuring the concentration of an analyte with statistical confidence). A true "non-detect" (i.e., no peak observed for the analyte) was reported by the laboratory as ND or 0.000 as was flagged with an "a" code. If the laboratory picked up a signal or peak for an analyte that translated to a concentration less than their declared MDL, but still was indicative of the presence of an analyte, the laboratory reported an estimated concentration for that analyte and flagged the data with a "b" code (see section 6.2 for detailed discussion).

9.2 Quality Assurance/Quality Control Methods

If results for the QC samples did not fall within certain pre-established control limits, the analysis of a batch of samples was not considered acceptable. These and other quality control issues are coded in four data qualifier codes (QA_CODE) or "flags" used in the EMAP-E Louisianian Province tissue chemistry data set:

CH-A CODE

The "CH-A" code indicates that an analyte was not detected. When the "CH-A" code is used, the concentration field is left blank and the method detection limit for the analyte in that particular sample is reported under DETLIMIT.

CH-B CODE

It is sometimes possible for a laboratory to detect an analyte and report its concentration at a level which is below the calculated method detection limit for the sample. In these situations, the analyst is confident that the analyte was present in the sample, but there is a high degree of uncertainty in the reported concentration. The "CH-B" code is used to flag reported values which are below the calculated method detection limit for the sample. Such values are considered estimates only and should be used with discretion.

CH-C CODE

The CH-C code indicates that the laboratory routinely failed to meet one or more of the QC requirements and the data are unacceptable for use in the EMAP assessments.

CH-D CODE

The CH-D code indicates that there was insufficient tissue in a given sample for analysis of all chemical components. In this case, only one or two groups of analytes were measured (usually metals or TBT).

CH-E CODE

The CH-E code indicates that the laboratory experienced minor deficiencies meeting the QC requirements, but the overall data quality is judged to be reliable for EMAP assessments.

CH-F CODE

The CH-F code indicates that the tissue samples were lost or destroyed at the laboratory or that they were unusable because of poor preservation techniques.

CH-I CODE

Some analytes are difficult to quantify because they co-elute with other closely related analytes. This phenomenon is called "matrix interference". When this occurs, the suspect analyte(s) are given a "CH-I" code and concentration is left blank.

CH-X CODE

In favor of expediency, a laboratory may elect to cease reporting some of the analytes. EMAP protocol only requires that the laboratory analyze a given list of chemicals; when they go beyond this list and report additional chemicals, we include them in our data. The "CH-X" code indicates that an analyte has been excluded from a given set of data.

Only "unflagged" or CH-E coded values are considered valid and useful for most assessment purposes.

CH-Z CODE

Some of the analytes listed represent the sum of concentrations of similar analytes (e.g., PCB_TOT is the sum of the concentrations of all PCB congeners). In the event that the concentrations for all of the individual analytes included in the sum are non-detects (have CH-A code) the sum is missing. This is not technically a non-detect, but a sum of non-detects, hence the CH-Z code.

9.3 Actual Measurement Quality

The analytical laboratory responsible for the analyses of chemical contaminants in tissue samples collected during the 1991-1993 EMAP Monitoring in the Louisianian Province and the 1993-1994 R-EMAP Texas project routinely met the required QC criteria and the overall data are deemed acceptable for assessments.

However, one exception requires discussion and has been flagged with the "CH-C" code. Analytical results for toxaphene, a chlorinated pesticide, were reported at elevated concentrations for approximately 20 fish samples collected in 1991; no further occurrences were reported during 1992-93. The GC-ECD chromatogram for toxaphene results in a profusion of peaks routinely referred to as the "thumbprint" of toxaphene. It makes qualitative interpretation "iffy" and quantification, at best, a rough estimation. Confirmation by mass spectrophotometry is normally recommended for toxaphene "hits". However, the laboratory did not have mass spec capabilities readily available, therefore, the toxaphene hits are suspect, especially since there were no further incidents in 1992-93, and therefore, must be considered as unreliable data.

10. DATA ACCESS

10.1 Data Access Procedures

Data can be downloaded from the WWW site.

10.2 Data Access Restrictions

Data can only be accessed from the WWW site.

10.3 Data Access Contact Persons

Charles Howell
U.S. EPA - Region 6
Environmental Services Division
(214) 655-8354

10.4 Data file Format

Data can be downloaded as ASCII fixed format files.

10.5 Information Concerning Anonymous FTP

Not accessible.

10.6 Information Concerning WWW

Data can be downloaded from the WWW.

10.7 EMAP CD-ROM Containing the Data file

Data not available on CD-ROM.

11. REFERENCES

Heitmuller, P.T. and R. Valente. 1991. Environmental Monitoring and Assessment Program: EMAP-Estuaries South Texas coast: 1991 quality assurance project plan. EPA/ERL-GB No. SR-120. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

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Macauley, J.M. 1992. Environmental Monitoring and Assessment Program: Louisianian Province: 1992 Sampling: Field Operations Manual. EPA/ERL-GB No. SR-119. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

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12. TABLE OF ACRONYMS

ACRONYM	DESCRIPTION
EMAP	Environmental Monitoring and Assessment Program

EPA	Environmental Protection Agency
FTP	File Transfer Protocol
GPS	Global Positioning System
REMAP	Regional Environmental Monitoring and Assessment Program
WWW	World Wide Web

13. PERSONNEL INFORMATION

Charlie Howell
U.S. Environmental Protection Agency
Region 6, Environmental Services Division
First Interstate Bank Tower at Fountain Place
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733
(214) 655-8354
howell.charlie@epamail.epa.gov

Melissa M. Hughes
EMAP-Information Management
OAO Corp. c/o U.S. EPA NHEERL-AED
27 Tarzwell Drive
Narragansett, RI 02882-1197
(401) 782-3184 (Tele)
(401) 782-3030 (FAX)
hughes.melissa@epa.gov